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ABSTRACT

Educators who have to develop proposals must be concerned with making effective decisions. This paper discusses a number of educational systems management tools which can be used to reduce the time and effort in developing a proposal. In addition, ways are introduced to systematically increase the quality of the proposal through the development of better objectives, the reduction of error due to typist inserted errors, and the likelihood of additional revisions and modifications because of the ease of editing a proposal as it is being developed. Educational systems management tools include: (1) Needs Assessment; (2) Delphi Technique; (3) Task Analysis; (4) ABCD Procedure; (5) GANTT charting; and (6) PERT Network. One of the most powerful tools in increasing the quality of a proposal involves the computer and/or word processing system. A set of computer programs which are specific in name, but general in function, and which facilitate attractive, coordinated, correct output includes TENEX (DEC-10 operating system), Scribe (text formatter) and MSG (electronic mail system). (Author/RL)

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SYSTEMATIC ALTERNATIVES TO PROPOSAL PREPARATION

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SYSTEMATIC ALTERNATIVES TO PROPOSAL PREPARATION

As educational/research dollars become scarcer, the need to seek external funding for research and development projects increases. As a result, many of us are finding ourselves developing proposals at an increasing rate. However, this also means that the competition increases. Thus, it takes a better "mousetrap" and a better proposal explaining the "mousetrap" to get funded. Our key concern becomes spending time on only those ideas which are going to be funded -- for us! Decisions concerning the development of these winning proposals include:

1. Identifying great ideas whose time has come.
2. Identifying the best way to investigate the idea (best is defined as minimizing the time, and costs while maximizing the chance of a significant result or contribution).
3. Writing about this idea and procedure in a manner which is clear and concise so that its quality is self-evident.

There are some techniques which will force a proposal writer to develop this third point -- a quality proposal. Each individual professional must find his own procedures for resolving the first two issues -- great ideas and ways of examining them.

David Krathwohl, as well as several others, have prepared excellent guides to proposal presentation which can serve as a checklist. Unfortunately, these "how to" manuals are too general for detailed help on:

1. Focusing the topic
2. Developing the objectives
3. Identifying the needed resources
4. Delineating the time requirements, and
5. Determining the costs.

Furthermore, these manuals fail to discuss word processing

as a means of reducing time and effort when developing the proposal, and when modifying or editing the draft to make it look as good as the key concepts in the proposal. Techniques do exist today to more exactly assist a proposal developer concerning these points. The purpose of this paper then is to introduce a number of educational systems management tools which can help 1) increase the quality of the proposal and 2) reduce the time and labor needed to develop the proposal. The first tool we will discuss will help to assure that you really have conceived of a needed mousetrap.

NEEDS ASSESSMENT

Needs Assessment examines the discrepancy between "what is" and "what is wanted." In other words, it "is a mind set which asks three relatively simple questions:

- Where are we?
- Where do we want to go?
- How do we get from here to there?" (Sarthory, 1977, P.26)

Once the need has been identified, the focal point of the proposal will become clearer. We feel that once you adequately understand the problem or question, the project is 90% completed. Even with an RFP (Request for a Proposal) where someone else has decided on the focus of the proposal, a careful needs assessment is useful in accurately determining the exact requirements to be met and needed deliverables.

Needs assessment has been described in detail in many documents and will be only briefly discussed here. In determining "what is," use existing student records, literature, interview data (from educators, community members, students), etc. so that you can quantify (as far as possible) the existing situation. To determine "what is desired," use interview data and statements of goals or intentions. Again, put this data in quantitative forms whenever possible so that the proposal you develop reflects the difference between these quantitative sets

of data. Depending on the needs assessment procedure you follow you may prioritize the project goals, prioritize the needs statements, take two months to perform the assessment, involve more than one individuall, and do some field testing of a model ("Needs Assessment in Education", State of New Jersey, Dept of Ed., Feb 1974).

Needs assessment can provide a rational basis for program, personnel and resource decisions which must be made at a later time. It should help differentiate between means and ends and between desired and current organizational achievement.

DELPHI

A related technique that may be used at this time is the Delphi Technique. It is designed to pool expert opinion and to obtain staff consensus on the future need for the "mousetrap". This is usually done in seven steps:

1. Define the problem (to be given to the "panel of experts" -- which they will modify)
2. Set criteria for identifying the experts in the area
3. Select the experts
4. Prepare first round questionnaire
5. Distribute questionnaire
6. Tabulate/evaluate questionnaire
7. Provide anonymous data to the experts and repeat from No. 4 until consensus is obtained.

Today, these rounds may be done by the panel being located on isolated computer terminals and the total time reduced to an hour or so.

A modified version of the Delphi technique can also be used in establishing the cost effectiveness of a program. First, a rating value, determined by use of the Delphi technique, is assigned to each program. Each rating value is then divided by the total rating value in order to determine its percentage value

or "index of importance."
rating value/total rating value = index of importance in %

To find the cost effectiveness, the index of importance is multiplied by the percent in the program who learned from it and then divided by the cost.

Cost Effectiveness = I x N (F-B)/Cost with I=indexes of importance; N=Number in Program; F-B=Percent who learned from the program.

The higher the resultant ratio, the more cost effective the program. Obviously, the numbers used will be projections in the case of proposed programs. However, it is a means of providing a basis of comparison between established and proposed programs. Once the program is funded, this data provides the basis for comparing original estimates and a program's actual costs.

TASK ANALYSIS

Another tool to refine and improve the quality of a proposal is task analysis. This tool will help to focus on the specific activities or events which must be done in either the actual project or in preparing the proposal. Task analysis will help to translate the general goal-like statements resulting from a needs assessment into specifics which can later be developed into 1) time and cost data for the project or 2) behavioral objectives.

Task analysis dissects a "job" into carefully defined tasks and subtasks (a subtask being one step towards completion of a task). By thus breaking the project into its component tasks and graphically illustrating their relationship to each other, the problems of including unneeded tasks or excluding needed tasks becomes more obvious Whenever possible the generation of the tasks should result from a first hand observation of a proficient practitioner doing the task(s). If this is impossible, a group of "experts" should convene to discuss the projected tasks which must be performed. The resulting tasks should be ordered into a chronological task listing. A task listing should be done graphically as in Figure 1 in the Appendix.

The task hierarchy can be used in two ways when developing the proposal. First, it provides a basis for constructing a flowchart. (Figure 2, Appendix) A flowchart is important because it provides a graphic representation of the entire process at one time, of decisions and their results, and of steps and feedback loops. Second the hierarchy provides a basis for developing terminal and enabling objectives (discussed below) consistent with the tasks and goals of the proposal.

Because this process focuses on the degree of mastery, it lends itself to the planning and establishment of evaluation criteria. The criteria are important as they serve as a basis for future accountability. Behavioral objectives can also serve as the basis for overtly comparing programs. This can be critical when several proposals are competing for the same funds.

ABCD PROCEDURE

The ABCD procedure for developing objectives is a refinement of Mager's ABC method and was developed by the University Consortium for Instructional Development and Technology headquartered at Syracuse University. The use of this method will result in specific audience statements; behavioral statements; condition statements; and the degree to which the behavior must be performed statements. Details on this tool can be obtained from the Department of Instructional Technology, School of Education, Syracuse University.

Having focused the proposal and outlined the tasks required for its accomplishment the question of time arises. How long will each task take? How long will the entire project take? There are two tools that can be useful in making these needed estimates based on the quantified data already available: GANTT Charting and PERT. (Figures 3 and 4, Appendix)

GANTT

GANTT Charting is a graphic representation helpful in visualizing the total time requirements of the proposed activities, a calendar of working times which will show

overlapping activities and deadlines which must be met if the project is to be completed on time. The tasks are listed in their chronological order. This procedure is widely used and perhaps only the originator's name is unfamiliar.

While a GANNT Chart is suitable for most straightforward proposals, there are times when it is necessary to show at greater depth the task and time relationships. In a large proposal involving a number of individuals over a time span of a year or more, PERT (Program Evaluation and Review Technique) is useful.

PERT

PERT takes a time line a step further by showing interrelationships and dependencies of tasks while supplying a framework for calculating time, personnel, task priority, and project costs. From a task listing, a PERT Network is developed to show prerequisites and activities which can be performed simultaneously. In the PERT network, time estimates for each activity are the result of approximating a realistic, a pessimistic, and an optimistic completion time for each activity. These estimates are then weighted and averaged as follows to give an elapsed time:

elapsed time = optimistic time + 4 x most likely time
+ pessimistic time / 6

Once the time requirements have been calculated, the costs can be estimated. An individual's time involvement in each event is charted; the time is then totaled and multiplied by the salaries and the computer and other costs for each activity. The total cost of all the activities (plus indirect costs, etc.) will provide the total project cost.

COMPUTER TOOLS FOR PRODUCTION OF PROPOSALS

One of the most powerful tools in increasing the quality of a proposal involves the computer and/or word processing system. Regardless of the quality of thought expressed in a proposal, the means by which the thoughts are presented is of significant importance. Proposals which are thrown together on the eve of

the deadline, which represent the uncoordinated efforts of several authors, which contain numerous typographical errors or erasures, are bound to give the appearance of lack of interest in the proposal. This appearance is totally unnecessary given the availability of sophisticated computer tools in most major computer centers. Below we describe a set of these programs which are specific in name, but general in function, which facilitate attractive, coordinated, correct output.

EASING COMMUNICATION AND REDUCING PRODUCTION TIME

Recent developments in office automation computer software have come a long way in facilitating joint production of products such as proposals. A large part of each such effort, when accomplished by traditional methods, consists of attention to minutiae such as section and page numbering, backward referencing and tables of contents and indexes. Such issues consume time, effort, and increase the chances of error, especially when several iterations, or several persons, or both are necessary to complete the project. In addition, simply keeping track of successive drafts in multiple copies and communicating among the co-authors can be exasperating at the least, and another source of confusion or errors at worst.

What has been needed is a way of performing these essentially clerical tasks, while insuring the correctness and attractive form of the final project. Also needed has been a system by which drafts could be shuttled among the authors without wasted time and effort, as well as complete communication about changes or comments.

This introduction to product development utilizes a document production system called SCRIBE, one of a number currently available on larger computer systems. This should not be seen as an endorsement of SCRIBE, but rather an example of a rather fully formed system which produces attractive documents with a minimum of difficulty.

In general, the authors of a document need to have access to a moderately large timesharing computer system with resident

documentation production system, electronic mail and perhaps some additional software. In our example, all authors need access to TENEX (DEC-10 operating system), Scribe (text formatter) and MSG (electronic mail system).

Initially, each author is given particular sections to construct, which are entered in a text editor and corrected or modified by any author. Authors indicate headings or subheadings with the appropriate designators (@MajorHeading in the case of SCRIBE) and some few additional designators for enumerated paragraphs or special page format. A designated author is responsible for constructing a master file which references the several separate files. This master file tells the system where each section is, and causes the system to fill in header reference numbers, chapter headings and backward and forward references. The system also automatically constructs a table of contents with page references, and can index and if appropriate, format a bibliography.

Finally, when the copy is approved for final distribution, it can be run off on a range of output devices, including typesetting equipment, without concern about fonts or type sizes on the part of the major author. Included in the Appendix are listings of sample messages among three participants, raw text file (prior to formatting) and a small fraction of a finished proposal.

As another example, this text was entered from terminals at work and at homes of the participants, transferred between computers for final preparation, run through Spell, Scribe, and output on a Diablo printer. And although the activity is not inexpensive, the speed with which a document of this type can be put together, and the resultant attractive and correct copy are well worth the expense.

Summary

In conclusion, the use of these systems management and computer tools should result in facilitating the writing and preparation of the proposal. They should help in smoothing what

can otherwise be a frustrating experience. Try using these techniques on the next quest for funding and see if they don't result in a winning proposal.

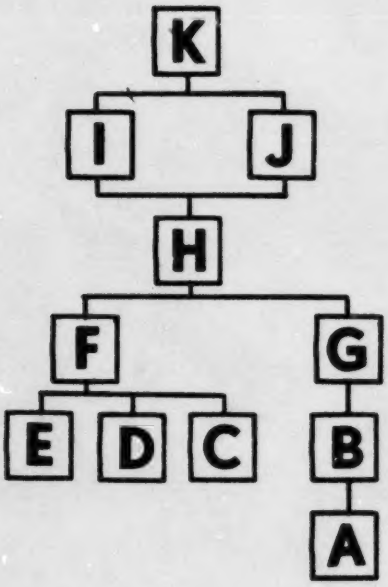

Figure 1. Task Hierarchy

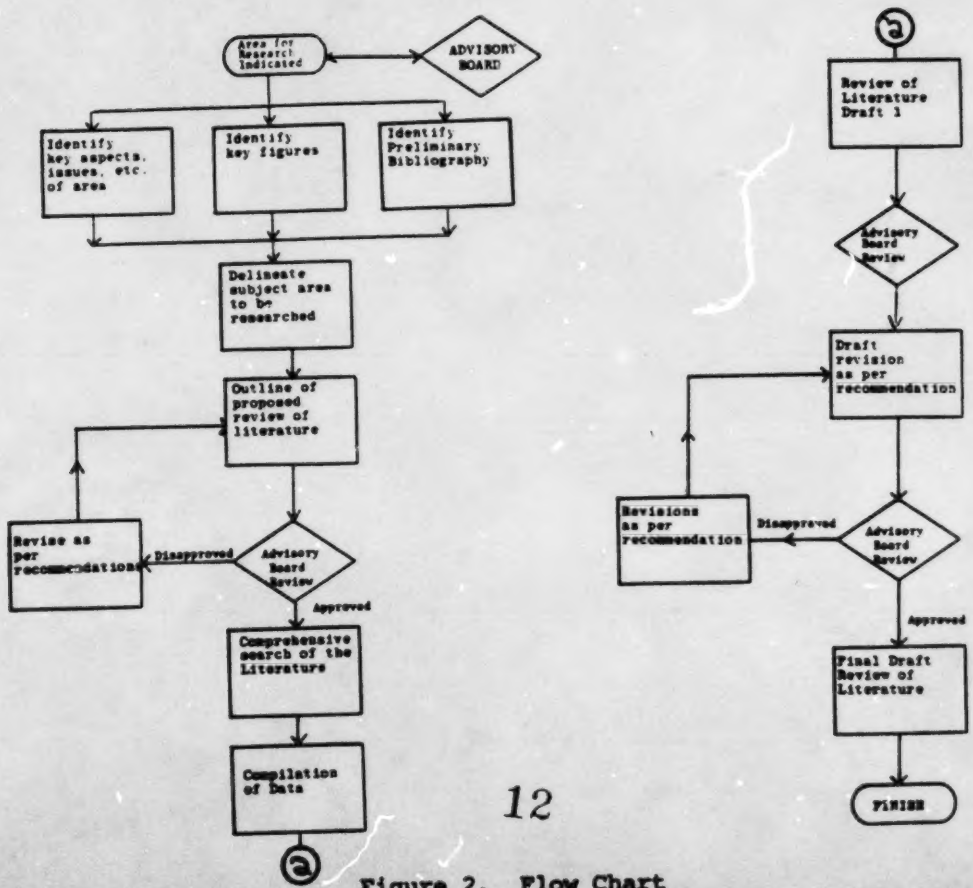

Figure 2. Flow Chart

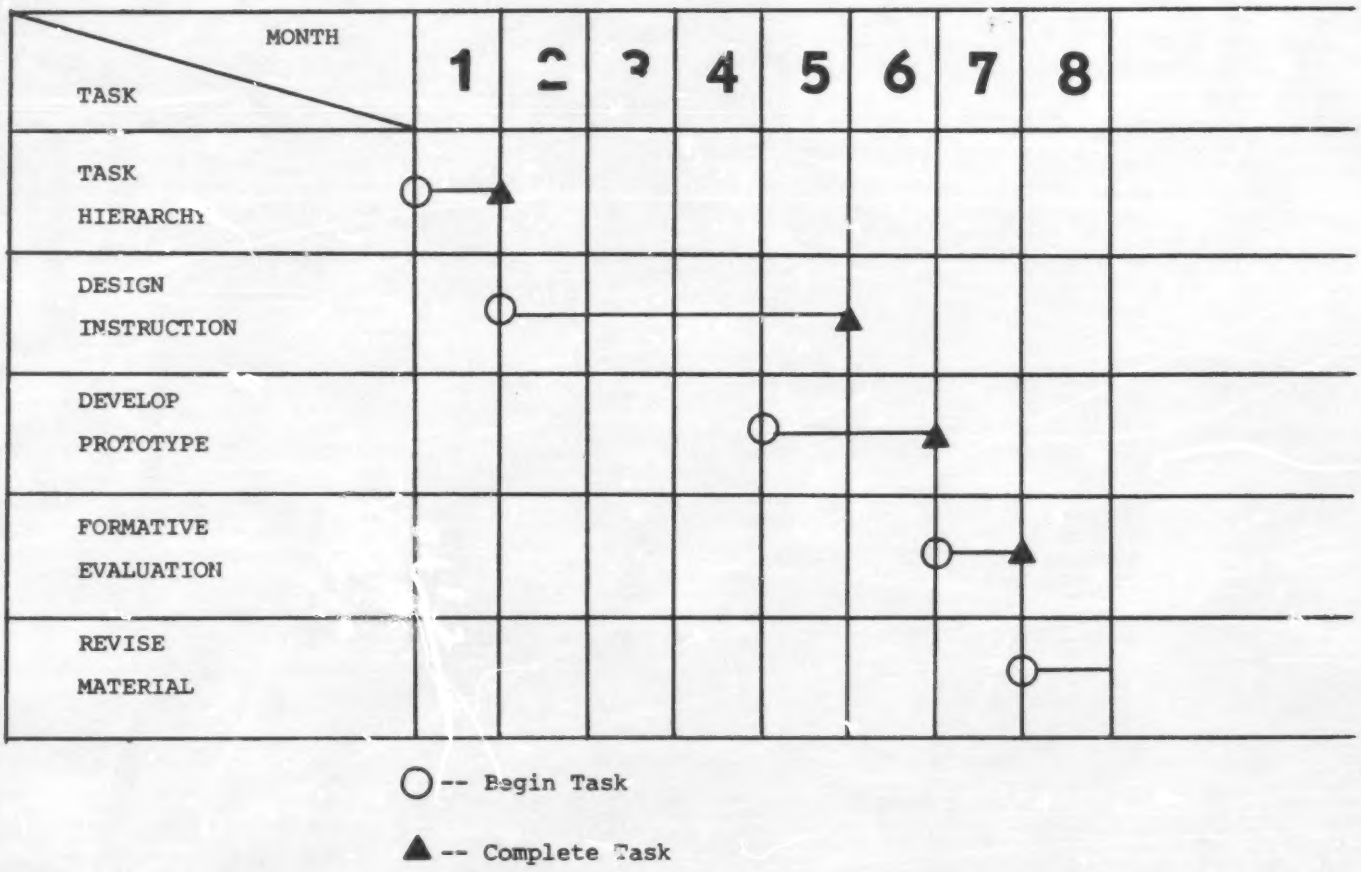

Figure 3. Sample Gantt chart

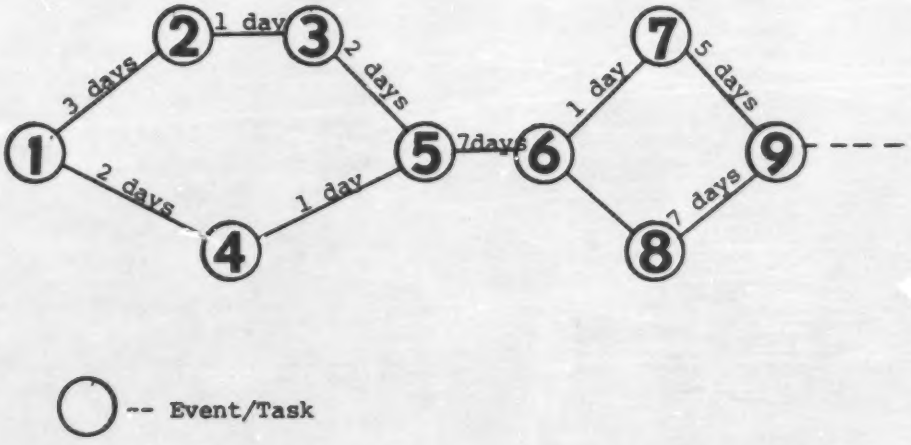

Figure 4. Pert Network

1-APR-81 10:18:30-PST,392;000000000001
Date: 1 APR 1981 1018-PST
From: ROBERTS at USC-ECL
Subject: AERA paper
To: Rogers, Smith

Dick and Ron

I am appending my introduction to this message so you can see what the thrust will be. Please let me know if you have suggestions/ improvements. Remember that the session is Thursday, April 16 at 10:35, so we need to keep up momentum toward the finished product.

Regards,

Dan

3-APR-81 10:20:45-PST,4[illegible];000000000001
Date: 3 APR 1981 1020-PST
From: ROGERS at USC-ECL
Subject: First revision
To: Roberts, Smith

Dan and Ron

Since the paper is getting large enough that it is desirable to keep copies from proliferating, let's use the <Common> directory to edit the paper. Connect to that directory and edit as necessary, then let us all know what you have done, and some idea of where, so we can comment and further refine.

Later,

Dick

5-APR-81 10:22:31-PST,382;000000000001
Date: 5 APR 1981 1022-PST
From: SMITH at USC-ECL
Subject: Just about final draft
To: Rogers, Roberts

Dan and Dick

Since we are getting close to final consensus on the paper, I will begin to put it in "pretty" format. After I have accomplished that, I will distribute line printer versions for your comments. Should get it out by about midday tomorrow.

See you

Ron

6-APR-81 10:25:1?-PST,568;000000000001
Date: 6 APR 1981 1025-PST
From: ROBERTS
Subject: I guess this is it!!
To: Rogers, Smith

Dick and Ron

Since the suggestions seem to have stopped, I assume you two have no further refinements. I believe that we have a very nice paper on our hands. The final copies will come off the typesetter this afternoon. Please get over to my office between 2 and 3, and we can look over the sheets and determine if we are ready for offset.

Thanks for the quick attention to the paper. One week from start to finish is great work.

Thanx again,

Dan

@part(ch1,root "arpa.mss")
@chapter(Background and Introduction)
@section(Introduction)
This is a proposal to establish a computing resource of one or two Digital Equipment Corporation PDP-10 machines for use by various DARPA contractors, including those at USC and remote users. This proposal is motivated by the needs of increased computing for DARPA/IPTO sponsored research at the Image Processing Institute at USC and by the need to provide additional resources for other DARPA sponsored projects at reasonable cost.

The proposal is made jointly by the Image Processing Institute (IPI) and the Engineering Computer Laboratory (ECL), whose history and activities are described below.
@section(Image Processing Institute)
@subsection(Background)
The University of Southern California Image Processing Institute (IPI), located in Powell Hall on the USC campus, is a research unit of the School of Engineering involved in basic and applied studies in the fields of digital, electronic, optical and hybrid methods of image processing, image analysis and machine perception. Other related research areas of interest include artificial intelligence, robotics, and multidimensional signal processing. The Institute maintains close academic ties with the Department of Electrical Engineering and the Department of Computer Science. Institute research faculty and staff actively direct graduate students in research leading to the Ph.D. degree in these departments.

The Image Processing Institute has been in existence since 1971 and has grown to represent one of the finest university facilities available for conducting research in digital processing of images and other multidimensional data. The present facilities of the Institute include special purpose image digitization, display and recording equipment plus connection to the computing facilities of the Engineering Computer Laboratory (ECL). The ECL DECSystem10 facility is used for most IPI computing and several DEC PDP-11 minicomputers provide a connection to the ECL facilities and are used to control image digitizers, recorders and displays in the IPI laboratory. The IPI laboratory also contains photographic facilities, optical information processing equipment, and television systems for use by the research staff. The Institute employs a full time professional staff including photographic technicians, programmers, electronic engineers, equipment operators and support personnel.

Chapter 9 of this proposal is a brochure describing IPI research programs and capabilities in detail.
@subsection(DARPA funded research at IPI)
Although image processing research had been in progress at USC since 1965, in 1971 with the support of the DARPA Information Processing Techniques Office (IPTO), it expanded to a large scale program. Many faculty and students have performed research in image processing under DARPA sponsorship at USC, and several have gone on to become leaders in this field in academic, industrial and government sectors.

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1.2.2. DARPA funded research at IPI

Although image processing research had been in progress at USC since 1965, in 1971 with the support of the DARPA Information Processing Techniques Office (IPTO), it expanded to a large scale program. Many faculty and students have performed research in image processing under DARPA sponsorship at USC, and several have gone on to become leaders in this field in academic, industrial and government sectors.

Over the years, the original research program in image processing has evolved into the Image Understanding (IU) program, which uses machine perception and artificial intelligence techniques to extract non-pictorial representations or descriptions from images. Our current IU research is supported by DARPA under contract F33615-80-C-1080, monitored by the Air Force Wright Aeronautical Laboratory. The greatly increased computational needs of this effort are a major motivation for the computing resources proposed here.

1.3. Engineering Computer Laboratory

The Engineering Computer Laboratory (ECL) is also a part of the School of Engineering. Originally established in 1967 to house an IBM 360 model 44 and a Beckman analog computer, the Engineering Computer Laboratory has grown and expanded as the School of Engineering has grown and expanded. At the present time, ECL contains three DECSystem10 processors, two running TOPS-10, one running Tenex. The Tenex machine is a host on the ARPANET and is accessible through TELENET. These processors are operated for the School and the University to provide research and instructional computing facilities in support of the academic program.

1.4. Needs for IU Computing

1.4.1. Growth of IU Computing

The computing needs of our DARPA/IPTO supported Image Understanding research have increased dramatically in the recent past. This increase reflects results of progress in previous research to the point where application to analysis of large, complex images can be seriously investigated. The major reasons for increased needs are summarized below:

1. **Increase in Image Size** Until recently, the size of the "standard" images used in the IU community was 256x256 or 512x512 pixels. However, this resolution is completely inadequate for complex aerial images, and especially for the cartographic applications of the Defense Mapping Agency (DMA). For some time we have been using 2kx2k images. For an original 9 inch square image, even this resolution is much lower than the photographic resolution. Note that the

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